SWEDISH EXPEDITION TO THE NORTH ATLANTIC GULF STREAM

By LEONARD R. SCHNEIDER

After a successful three months' cruise during June, July, and August in 1929, Dr. J. W. Sandström's 1930 summer expedition into the North Atlantic Gulf Stream area came to an end 43 days after the party had embarked. Engine failure only 18 days from port caused the *Rane* to be turned about, and some 15 days later, under sail, the vessel reached the Norwegian town, Bodo, where repairs were made. From Bodo the vessel returned to Sweden.

This information appears in a feature article in the October 14 issue of the Dagens Nyheter, a Stockholm daily. Further items of interest contained in both the article and its accompanying map are given in what follows.

Doctor Sandström's expedition left western Sweden on July 24, heading for the Shetland Islands and Iceland. Near the Skagerak and in the North Sea the surface water was found to be unusually warm, the temperature being 16° C. Near the Shetlands a day or two later the sea-water temperature was 13.5° C., and immediately upon the western side of the islands the surface-water temperature was 12.94°. At this point, at a depth of 50 meters, there was a temperature of 9.89°; at 100 meters, 9.40°, and at 150 meters, 9.00°.

The *Rane* reached the Faroes on the 28th of July, and between the Faroes and Iceland temperatures of 9.89° at the surface, 9.78° at 50 meters depth, 8.30° at 100 meters, 7.35° at 200 meters, and 4.20° at 300 meters were recorded. On July 31, near Seydisfjord, Iceland, both the air and water temperatures were 5° C. At this point sea water at 50 meters depth was 4.32°.

It is interesting to note that only a few hours from Seydisfjord the sea water temperature rose from 5° to 9°. At 67° 43′ N. and 13° 33′ W. at 100 meters depth there was a temperature of 0°, the coldest recorded on the cruise. Over this cold water, from the surface down to 20 meters, the thermometer registered 7.35°. With the vessel near the western limit of the Gulf Stream, its course was directed eastward along the sixty-eighth degree of latitude, where the following increases in temperature were observed in the surface water between August 1 and 6. They were: 7.4°, 7.8°, 10.3°, 11.9°, 14.7°, and 16.0°. For the same days, but at a depth of 100 meters, these temperatures were recorded: 0°, 4°, 8°, 8°, 9°, and 10°. The warmest water was southwest of Lofoten.

On August 11 the *Rane* was at 72½° N. latitude and again at the western edge of the Gulf Stream. It was at this point that sails were resorted to after the engine trouble developed. From the records of the return trip, Doctor Sandstrom tells his readers that in the middle of the Skagerak, where about the 1st of September one may expect to find 4° C. water at a depth of 10 meters, the water on this date, 1930, had a remarkably high temperature, namely, 15.7° at the surface, 15.5° at 10 meters, and 9° at 60 meters. Doctor Sandstrom further remarks that this season the North Atlantic Gulf Stream is not only unusually warm in the north and west parts but also in the North Sea and Skagerak regions.

METEOROLOGICAL PECULIARITIES OF THE YAKIMA VALLEY, WASHINGTON

By EDWIN H. JONES

[Weather Bureau, Yakima, Wash.]

A paper entitled "Meteorological Peculiarities of the Yakima Valley" might seem to be out of place in a convention dedicated to the fruit-frost and aviation phases of meteorology. It may be shown, however, that it is with these two activities of weather men that the weather abnormalities of the Yakima Valley are most directly connected.

At present the Yakima Valley project consists of 350,000 acres of irrigated land, most of which is highly cultivated. Its products are many, but fruit growing leads. In the average year there are shipped 48,650 carloads of products from the soil, 20,000 carloads of which are fruits. The total value of all these products is estimated at over $40,000,000 per year. As an isolated and landlocked district surrounded by mountains and desert, this agricultural community is confronted at the outset by two fundamental problems. First, the successful protection of its crops during growth against frost and the other hazards of climate, and then satisfactory transportation and communication with the outside world. The fruit-frost, spraying, packing, and shipping seasons provide activity for the meteorologist. In the successful development of aviation, with which the future of Yakima probably is bound up to the highest extent, an additional opening is offered.

The Yakima Valley is not "a valley," but a series of valleys or depressions in the general terrain. While all are drained by the Yakima River and its tributaries, there are no less than five distinct sections, each separated by sharp ridges of land rising from 800 to 1,500 feet above the valley floor, and with nothing more than narrow water gaps between for drainage both of water and air. The entire district slopes gently from an average elevation of about 1,600 feet above sea level at Ellensburg to 500 feet near Kennewick. The irrigable part is about 200 miles by road from end to end and perhaps 25 miles across at the widest place. Beginning at the north with the areas under irrigation and cultivation, there are: The Ellensburg or Kittitas, Selah, Naches, Upper Valley, and Lower Valley sections. Part of the Kennewick section is also drained by the Yakima River and is a part of the Yakima Valley. The Yakima Valley as a whole is closely adjacent to the Cascade Mountain system, the separating ridges being part of the foothills and the Cascade Mountain platform itself rising less than 25 miles directly to westward. It is this contiguity of the mountains, of course, which gives the Yakima Valley weather features peculiar unto itself.

Probably no person ever has attempted forecasts for the State of Washington without being agonized over the actions of the Yakima weather. The most common anomalies are temperatures that fall below the disaster point when other east-portion districts run comparatively safe, or occasionally, minimum temperatures that show a rise when other stations have no change. And there is the tendency to extreme dryness, even during the passage of a

considerable storm, then unexpectedly a few hundredths of an inch of precipitation to spoil an otherwise good forecast after the disturbance seemingly was all over. What is the exact nature of the terrain and what are the physical causes to produce such abnormalities? It is believed that the key to the answer may be summed up as follows: A high mountain barrier close to westward, but with a sizable gap to northwest for admittance of air currents. A gradually descending table-land from near this gap to southeastward, but with local air drainage considerably interfered with by numerous cross ridges. (The gap referred to is the comparatively low and narrow part of the Cascade Mountain platform in the vicinity of Snoqualmie Pass.)

With such a setting, the most pronounced adiabatic and radiational effects in the behavior of temperatures must be expected. It is the task of the forecaster, through continued application, to be able to estimate these effects. Variations in the maximum temperatures are uncommon and unimportant. In estimating minimum temperatures, the well-known hygrometric formula is used in connection with the evening weather map. The problem is to find the departure of the coming minimum above or below a median figure for dew point and humidity. Common types are: 1. Any pressure formation that will produce a north to south gradient, which, even weak, will cause steady, descending air movement at night with comparatively high temperature, while there may be no wind with lower temperatures in other districts. 2. The typical frost type is the weather map with indefinite gradient, or even strong southwest to northeast; then ideal conditions for uninterrupted radiation are provided, and the temperature fall is limited only by temperature of the dew point and time of sunrise. 3. But, let there be a south to north gradient, and a sluggish effect is noticeable, favorable for the development of cloud and higher temperatures. 4. With east to west gradient, cold air may be imported from the highlands of the Rockies and temperatures drop, even in the face, apparently, of a coming storm. Forecasting from the morning map, type and intensity which will produce the nighttime conditions have to be anticipated.

In the matter of precipitation, effect of the terrain seems to be even more pronounced. An increase in the annual total is noted as the Snoqualmie and Columbia River gaps are neared. The greater portion of the valley must get its precipitation through convection in a comparatively dry atmosphere or from admixture of the local atmosphere and a descending, drying current. As a rule, appreciable precipitation does not occur with a strong barometric gradient or even moderate general winds. The most common and favorable formation for precipitation is believed to be just after the center of the storm has begun to pass eastward, distance between the isobars widens out, and a certain amount of convection and mixing in a fairly moist atmosphere is possible.

One of the most remarkable peculiarities of the Yakima Valley weather is the variation of wind velocity with the seasons. The prevailing direction the year around of course, is northwest. During the winter months, December, January and February, when inland temperatures are low, there is no stimulation to the wind development of passing pressure formations. The absolute lack of local air drainage is most noticeable, the average hourly wind velocity at the Yakima Weather Bureau station being only two or three miles per hour. Smoke from local heating plants gathers over and in the city, conditions often rivalling those in the industrial centers of the east. With the coming of spring in March, however, the east to west temperature gradient is reversed. Each passing of a LOW trough is the signal for a rising northwest wind, with maximum generally in the afternoon and gradually dying down at night.

At intervals, winds develop in the spring season that are a temporary hazard to aviation. The pressure type is invariably an Alberta LOW with trough to southward. The difficulty in forecasting these winds any satisfactory time interval in advance is due to the variations in intensity of the different LOWS, a condition which is not always apparent on the weather map. Such winds often stir up dust storms of wide extent, interfering with visibility occasionally enough to obscure a landing field. The vertical limit of a dust storm, however, is rarely over 1,000 feet.

THE PASSING OF THE MIRAGE LOCALLY

By A. A. JUSTICE

[Weather Bureau Office, Dodge City, Kans., July 27, 1930]

Mr. Robert M. Wright, in Dodge City, the Cowboy Capital, pioneer plainsman, freighter over the Old Santa Fe Trail, and for more than a half century an observer of conditions in Kansas, Colorado, and New Mexico, paints a very good word picture of the mirage as he saw it in the days before extensive settlements had been made in this region by the white man. He tells how the prairies were changed from dreary wastes into scenes of enchanting beauty, how cities, castles, and fortresses suddenly sprang up in a land where no man dwelt, and how lakes and rivers of sparkling water shimmered ahead of the thirsty traveler enticing him from the beaten trails, on and on to his death. He ends with the following:

> With the trail of the plow, followed by immigration and civilization, the wonderful mirage is a thing of the past. It is only now and then that one gets a glimpse of its beauties; its scenes of magnificence, far beyond any powers of description, I shall never see again.

That the mirage was of common occurrence during the period of settlement of the plains there can be little doubt. The frequency of its mention in the literature of the period is convincing evidence of that. And then, too, we have the corroborative testimony of the older living residents.

And what of it to-day? Is it still to be seen as often and on the same grand scale as it was 30, 40, or 50 years ago? Unfortunately our records are meager. The Weather Bureau has never taken very particular notice of the mirage nor compiled any data as to its occurrence, either in years past or to-day. It is evident, therefore, that we can not say definitely whether or not the mirage is passing as Mr. Wright claims.

But curiosity impels the question as to what other people think about it; what is the experience of some other old-timers. The mirage is an interesting phenomenon and it played a prominent part in the early history of the plains. It was something new and strange to the early settlers and they wrote back and told their friends whom they had left behind about it. So its fame spread.

Stories of how the mirage lured the thirsty travelers from the beaten trails are not figments of the imagination in all cases. First-hand knowledge of such experiences is related by living pioneers. But as a rule the